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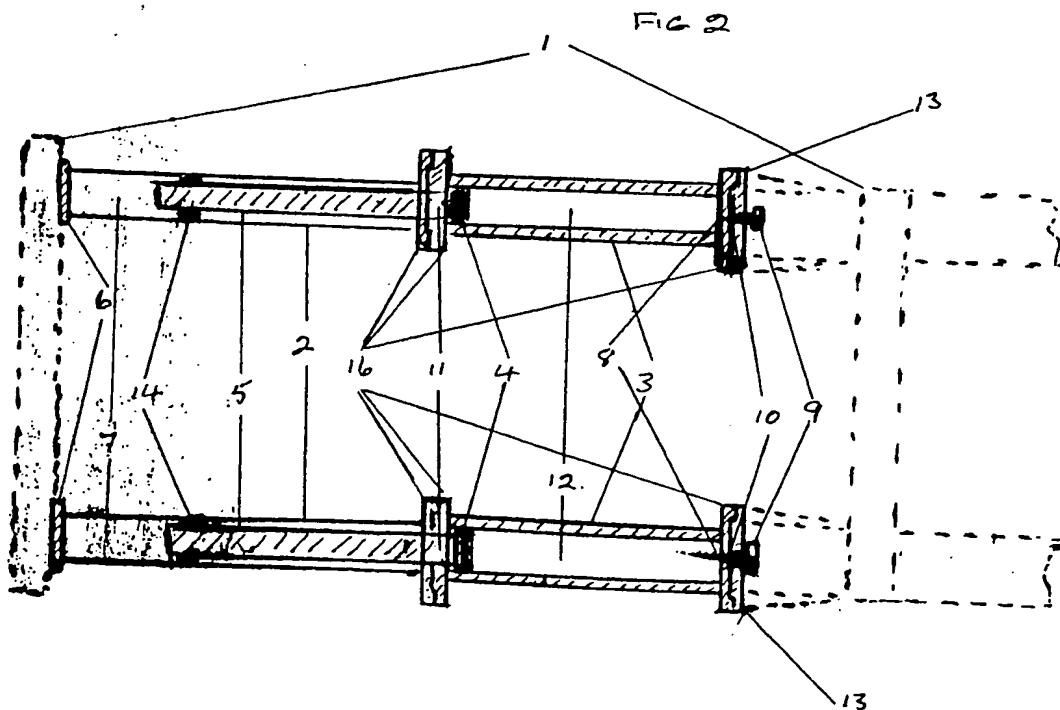
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GB 1384651 US 4257581 US 3860258

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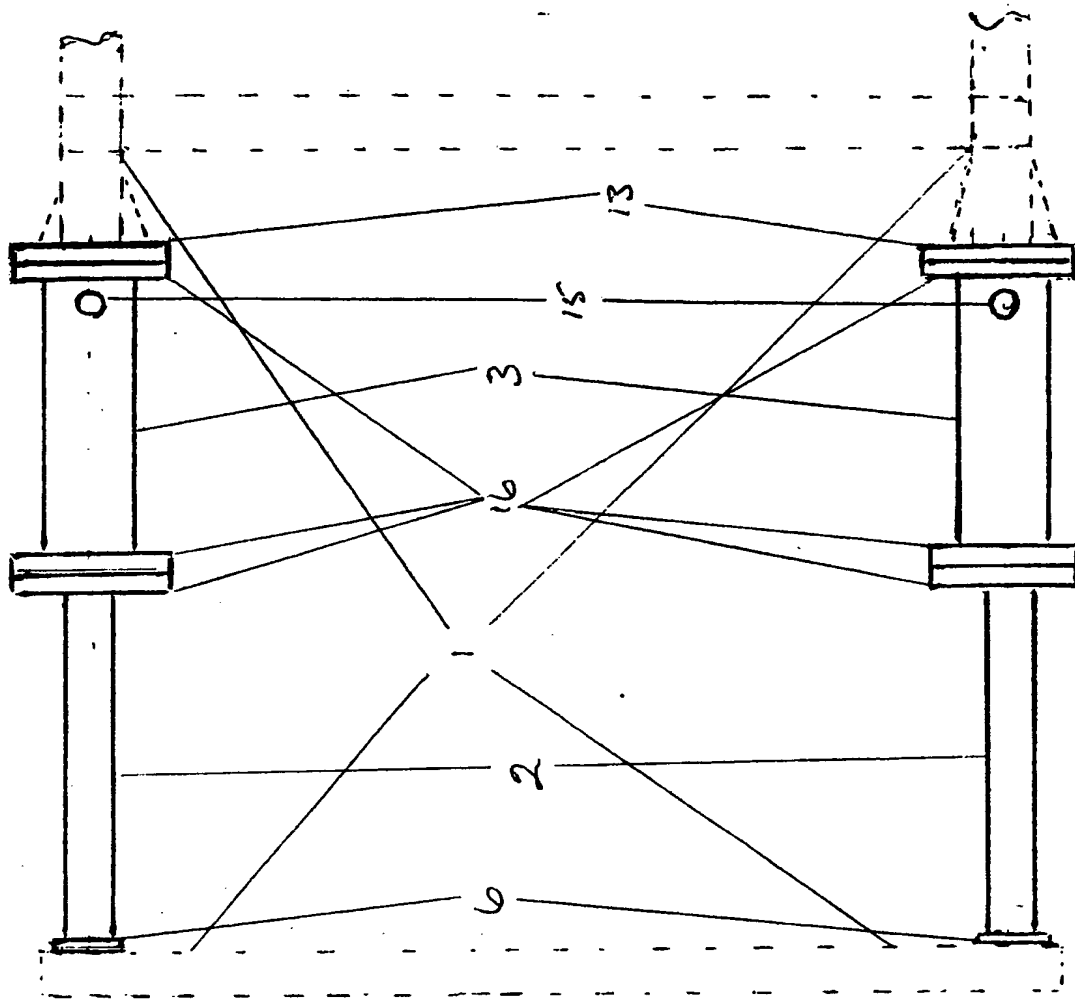
(54) Violent impact energy absorber

(57) A violent impact energy absorber as fitted to a vehicle subframe or chassis comprises collapsible tubing 6 and hydraulic piston/cylinder units 3 in series. Tubing 6 alone distorts under low velocity collisions and may be replaced, but under high velocity impacts units 3 also contract to take up some of the force. Units 3 can include a throttle 8 and bursting seal 10, and an air lock (15, Fig. 3).



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FIG 1 1/3



SPECIFICATION

Violent impact energy absorber

5 This invention relates to energy absorbers within the chassis/subframes of any vehicles. Many vehicle manufacturers have designed chassis/subframes which collapse in part during head on collisions, thus reducing the chance of death or injury to the occupants or the vehicle due to the energy absorption in the leading collapsed area of the chassis/sub frame.

10 This invention which is part of the chassis/subframes and can be used for mountings and other fittings, consists of steel tubing in the forward area e.g. square section with hydraulic cylinders and rams following to the rear.

In minor mishaps or low velocity crashes the cylinders will not operate and the forward damaged steel tubing can be replaced. In higher velocity head on collisions the comparatively weaker tubing collapses in concertina form, forcing the ram forward into the cylinder which is fitted with a low pressure bursting seals covering a small orifice in the rear flange of the hydraulic cylinders.

As the ram advances the pressure exerted on non combustible liquid contained in the cylinders bursts the seal and the liquid goes to atmosphere.

A dome at the top of each hydraulic cylinder contains an air pocket which will tend to reduce the (hydraulic knock) by increasing the air pressure in the dome as the liquid is being discharged.

A specific embodiment of the invention will now be described by way of example with reference to the accompanying drawings in which:-

40 *Figure 1* shows a plan view of units in position assembled to the chassis/subframe of a vehicle.

Figure 2 shows a plan view half section which illustrates the operation of the units.

The forward end 1 is subject to a minor low velocity collision distorting the forward section in the "free area" 7 and may be replaced from the bolted flange (spigoted) 16.

50 In higher velocity collisions the "free area" 7 yields under the extra force in a concertina pattern forcing the hydraulic rams 5 into the cylinders 3 which contains a suitable liquid 12, as the rams 5 proceed, pressure is built up inside the cylinders compressing an air lock in domes 15 (to reduce the instant "hammer" effect of the liquid), as the pressure continues to increase the low pressure bursting seal 10 fails allowing the liquid to be forced through the aperture/orifice 8 and bored seal retaining plug 9 to the atmosphere, thereby lessening the impact experienced to the occupants of the vehicle.

65 *Figure 3* shows an elevation half section of one unit showing a push pad 6 the "free

area" 7 the hydraulic ram 5 the piston with seals 4 the plastic steady 14. The bolted spigoted flanges 16 the air dome 15 the hydraulic ram seal 11 the low pressure bursting seals 10 the orifice 8 the bored seal retaining plug 9 and the spigoted thrust flange to the chassis/sub frame 13.

CLAIMS

75 1. A violent impact energy absorber comprising a cylinder flanged at each end, jointed and spigoted for location and rigidity, a piston with seals, a piston rod sealed at the forward flange end, mating transition flanges, a forward lead section with push plate, and incombustible liquid.

80 An air pocket dome is situated uppermost at the rear of the cylinder near the rear flange of the cylinder which mates with a thrust transition flange.

85 The rear cylinder flange has an orifice in the centre matching an orifice in the thrust transition flange which is provided with a low pressure bursting seal and bored retaining plug.

90 The unit is adapted to be situated each side and within a chassis/sub frame of any vehicle or any position according to design.

2. A violent impact energy absorber as claimed in 1 wherein dimensions may vary e.g., diameter of cylinder, diameter of orifice and length of stroke depending on the mass of the vehicle.

3. A violent impact energy absorber as claimed in 1 or 2 is provided with a steady as a support for the piston rod housed in the forward lead section.

4. A violent impact energy absorber as claimed in claim 2 or claim 3 wherein means are provided for securing and sealing the unit to a chassis/sub frame.

105 5. A violent impact energy absorber substantially as described herein with reference to Figs. 1-3 of the accompanying drawings.

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FIG 3 3/3

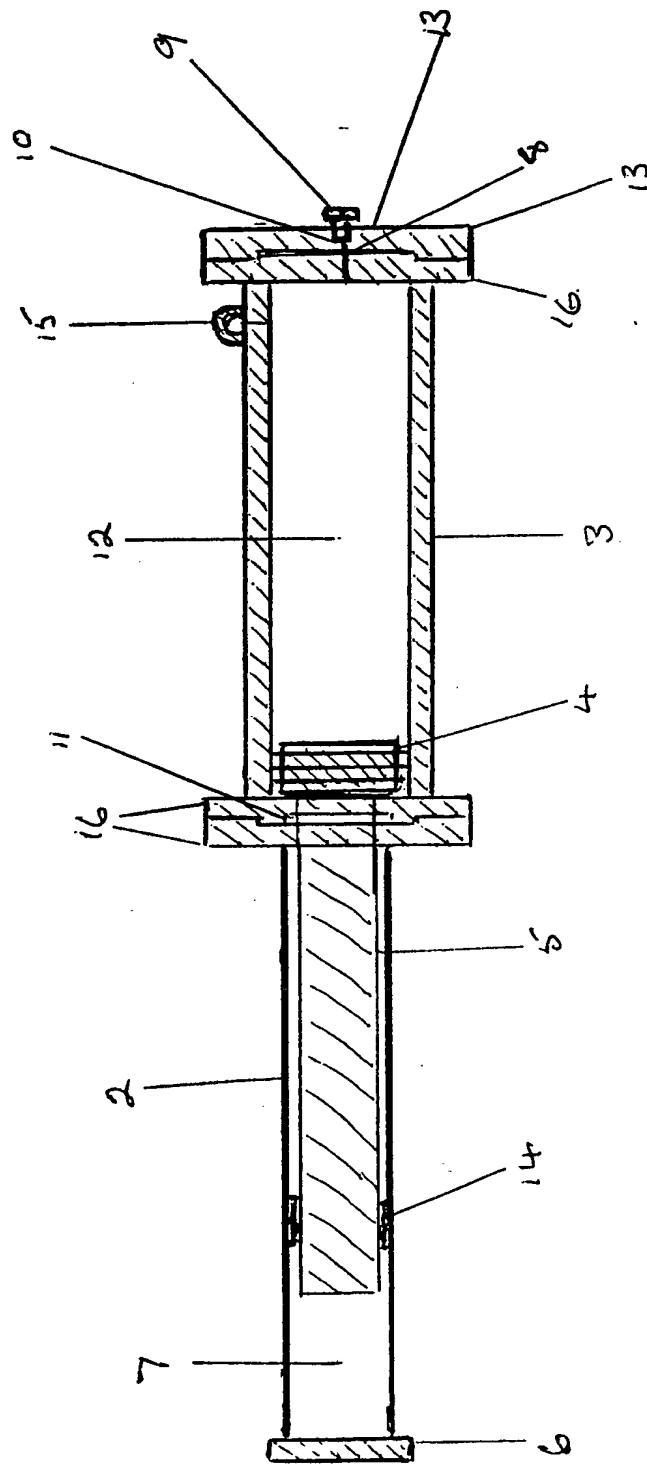
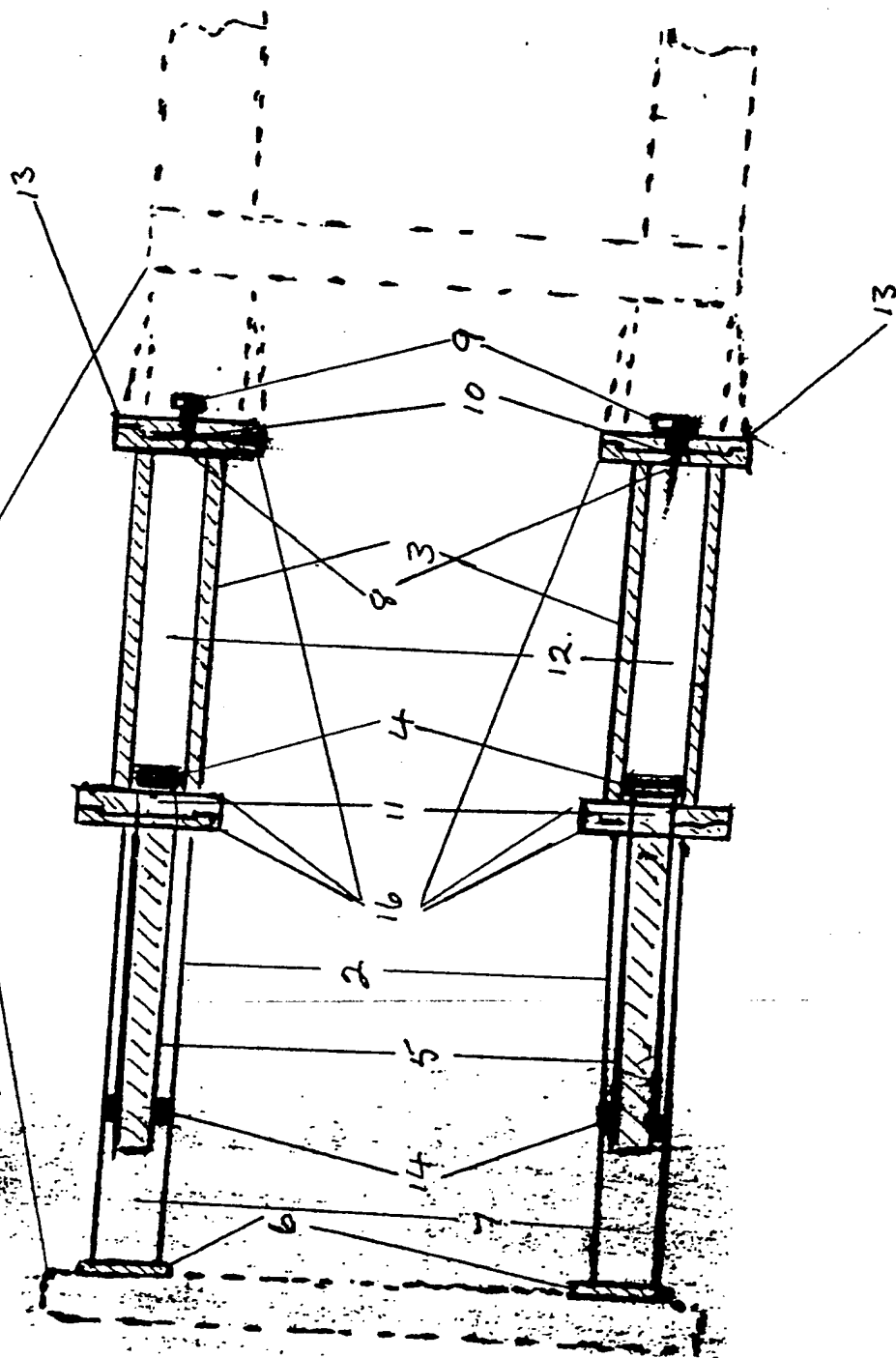


FIG 2 2/3



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